IN THE CLAIMS

1. (Original) A method for etching polysilicon gates, the method comprising the steps of:

flowing a first gas mixture into a plasma reactor containing a substrate with a polysilicon layer formed thereon, the polysilicon layer being masked by a hard mask, the first gas mixture comprising a bromine-containing gas, a chlorine-containing gas, an oxygen-containing gas, and a NF_3 gas; and

maintaining a plasma of the first gas mixture to etch the polysilicon layer; and

wherein flowing the first gas mixture comprises flowing the bromine-containing gas into the plasma reactor at a first volumetric flow rate, flowing the chlorine-containing gas at a second volumetric flow rate, and flowing the NF_3 gas into the plasma reactor at a third volumetric flow rate, the ratio of the third volumetric flow rate to the sum of the first volumetric flow rate and the second volumetric flow rate being in the range of 1:20 to 1:5.

2. (Original) The method of claim 1 wherein the gas mixture further comprises a N_2 gas.

3. (Original) The method of claim 2 wherein flowing the first gas mixture further comprises flowing the N_2 gas into the plasma reactor at a fourth volumetric flow rate, the ratio of the fourth volumetric flow rate to the third volumetric flow rate being in the range of 0 to 5:1.

4. (Original) The method of claim 3, further comprising:

flowing a second gas mixture into the plasma reactor, the second gas mixture comprising a bromine-containing gas, a chlorine-containing gas, an oxygen-containing gas, and NF_3; and

maintaining a plasma of the second gas mixture to etch the polysilicon layer; and

wherein flowing the second gas mixture comprises flowing the bromine-containing gas at a fifth volumetric flow rate, flowing the chlorine-containing gas at a sixth volumetric flow rate, and flowing NF_3 at a seventh volumetric flow rate, the ratio of the seventh volumetric flow rate to the sum of the fifth volumetric flow rate and the sixth volumetric flow rate being less than the ratio of the third volumetric flow rate to the sum of the first volumetric flow rate and the second volumetric flow rate.

5. (Original) The method of claim 4 wherein the polysilicon layer includes dopants of one or more kinds and a dopant concentration for each kind of dopants varies with a depth into the polysilicon layer.

6. (Original) The method of claim 5 wherein the polysilicon layer comprises an upper part and a lower part, the dopant concentration for each kind of dopants being higher in the upper part than in the lower part, and wherein the second gas mixture is flowed into the plasma reactor after portions of the lower part of the polysilicon layer are exposed to the plasma of the first gas mixture.

7. (Original) The method of claim 4 wherein the second gas mixture further comprises N_2.

8. (Original) The method of claim 5 wherein flowing the second gas mixture comprises flowing the N_2 gas into the plasma reactor at an eighth volumetric flow rate, the ratio of the eighth volumetric flow rate to the sum of the fifth volumetric flow rate and the sixth volumetric flow rate being smaller than ratio of the fourth volumetric flow rate to the sum of the first volumetric flow rate and the second volumetric flow rate.

9. (Original) The method of claim 8 wherein the ratio of the eighth volumetric flow rate to the seventh volumetric flow rate is substantially the same as the ratio of the fourth volumetric flow rate to the third volumetric flow rate.

10. (Original) The method of claim 4 wherein the bromine-containing gas comprises one or more of HBr, Br_2, and CH_3Br.

11. (Original) The method of claim 4 wherein the chlorine-containing gas comprises one or more of Cl_2 and HCl.

12. (Original) The method of claim 4 wherein the oxygen-containing gas comprises one or more of O_2 and He-O_2.

13. (Original) The method of claim 4 wherein maintaining the plasma of the first process gas comprises applying a first bias power to the plasma chamber to electrically bias the substrate with respect to the plasma of the first process gas, maintaining the plasma of the second process gas comprises applying a second bias power to the plasma chamber to electrically bias the substrate with respect to the plasma of the second process gas, and the first bias power being greater than the second bias power.

14. (Original) The method of claim 1 wherein the polysilicon layer comprises N-doped and P-doped regions that are etched simultaneously.

15. (Original) The method of claim 1 wherein the bromine-containing gas comprises one or more of HBr, Br_2, and CH_3Br.

16. (Original) The method of claim 1 wherein the chlorine-containing gas comprises one or more of Cl_2 and HCl.

17. (Original) The method of claim 1 wherein the oxygen-containing gas comprises one or more of O_2 and He-O_2.

18. (Original) The method of claim 1 wherein the bromine-containing gas is HBr and the chlorine-containing gas is Cl_2.

19-20. (Cancelled)

21. (New) A method for etching polysilicon gates, comprising:

providing a substrate in a plasma reactor, the substrate having a polysilicon layer masked by a patterned silicon dioxide hard mask;

flowing a first gas mixture into the plasma reactor containing the substrate, the gas mixture comprising a bromine-containing gas, a chlorine-containing gas, an oxygen-containing gas, NF_3 gas and N_2 gas; and

maintaining a plasma of the gas mixture to etch the polysilicon layer; wherein flowing the gas mixture comprises flowing the bromine-containing gas into the plasma reactor at a first volumetric flow rate, flowing the chlorine-containing gas at a second volumetric flow rate, and flowing the NF_3 gas into the plasma reactor at a third volumetric flow rate, the ratio of the third volumetric flow rate to the sum of the first volumetric flow rate and the second volumetric flow rate being in the range of 1:20 to 1:5.

22. (New) The method of claim 21, further comprising:

changing a composition of the gas mixture during etching of the polysilicon layer.

23. (New) A method for etching polysilicon gates, comprising:

providing a substrate in a plasma reactor, the substrate having a polysilicon layer masked by a patterned hard mask;

flowing a first gas mixture into the plasma reactor containing the substrate, the first gas mixture comprising HBr, Cl_2, O_2, NF_3 gas and N_2 gas; and

maintaining a plasma of the first gas mixture to etch the polysilicon layer through the patterned mask.

24. (New) The method of claim 23, further comprising:

wherein flowing the first gas mixture comprises a ratio of combined HBr and Cl_2 flow rate to NF_3 flow rate in a range of 1:20 to 1:5.

25. (New) The method of claim 24, further comprising:

etching a first portion of the polysilicon layer using the first gas mixture; and

etching a second portion of the polysilicon layer using a second gas mixture that has increased selectivity to a gate oxide layer underlying the polysilicon layer relative to a selectivity of the first gas mixture.